Name: _____   Date: _____
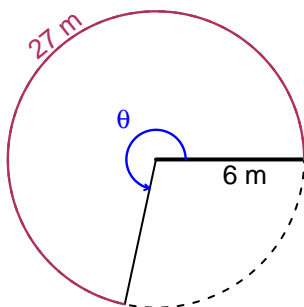
Trig Final (SLTN v694)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 27 meters. The radius is 6 meters. What is the angle measure in radians?
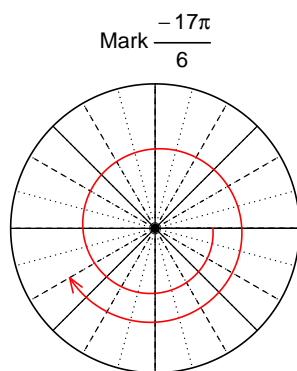

$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$
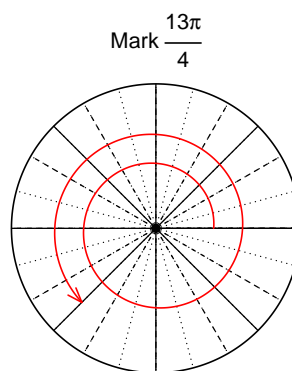
$\theta = 4.5$ radians.

Question 2

Consider angles $\frac{-17\pi}{6}$ and $\frac{13\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{-17\pi}{6}\right)$ and $\sin\left(\frac{13\pi}{4}\right)$ by using a unit circle (provided separately).

Mark $\dfrac{-17\pi}{6}$ Mark $\dfrac{13\pi}{4}$

Find $\cos(-17\pi/6)$ Find $\sin(13\pi/4)$

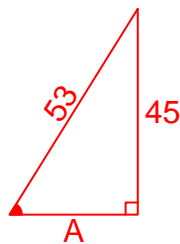$\cos(-17\pi/6) = \frac{-\sqrt{3}}{2}$ $\sin(13\pi/4) = \frac{-\sqrt{2}}{2}$

1

Question 3

If $\sin(\theta) = \frac{-45}{53}$, and θ is in quadrant III, determine an exact value for $\tan(\theta)$.

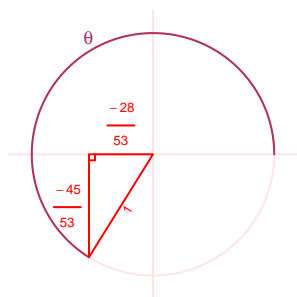Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.

Solve the Pythagorean Equation

$$A^2 + 45^2 = 53^2$$
$$A = \sqrt{53^2 - 45^2}$$
$$A = 28$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.

$$\tan(\theta) = \frac{\frac{-45}{53}}{\frac{-28}{53}} = \frac{45}{28}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 8.55 Hz, a midline at $y = -3.08$ meters, and an amplitude of 5.71 meters. At $t = 0$, the mass is at the maximum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 5.71 \cos(2\pi 8.55 t) - 3.08$$

or

$$y = 5.71 \cos(17.1\pi t) - 3.08$$

or

$$y = 5.71 \cos(53.72 t) - 3.08$$